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HIGH SCHOOL ENTRANCE EXAMINATIONS BOARD

DEPARTMENTAL EXAMINATIONS, 1967

GRADE IX

MATHEMATICS

Time — 2 hours.

DO NOT SPEND TOO MUCH TIME ON ANY ONE QUESTION.
READ THE QUESTIONS CAREFULLY.

Total Possible Mark — 209.

Write your name and school in the space provided on the separate answer sheet.

Do NOT write your name on this test booklet.

SECTION A of this paper consists of 82 questions, all of which will be machine scored.

In SECTION B, questions 83 to 90 inclusive, partial marks will be given for correct method. For this reason all work should be shown in the space provided for the solution. NO MARKS WILL BE GIVEN FOR WORK IN THE SPACE MARKED "FOR CALCULATION".

When making constructions be sure to leave all construction lines in your diagram. DO NOT ERASE THEM. They indicate to the marker just how the construction was done.

DO NOT FOLD THE TEST BOOKLET OR THE ANSWER SHEET.

Place your answer sheet BEHIND the test booklet and INSERT BOTH IN THE SAME ENVELOPE in such a way that the UPPER LEFT HAND CORNER OF THE BOOKLET (Candidate's Number) shows through the SLASHED CORNER of the answer envelope.

1	Marked by Sub-Examiner
2	Machine Scored
3	Final Score

(For the use of Sub-Examiners only)

54
17
67
th.
RR HIST

Values
2 marks
each

SECTION A

Answers to questions 1 to 82 are to be machine scored. You are to record your answers on the separate answer sheet. Each question has five suggested answers, only one of which is correct. Select the correct answer and record it on the separate answer sheet as shown below. Space is provided in the test booklet for calculations.

Example:

The sum of 2 and 3 is

A. 1 B. 5 C. 6
D. 8 E. 9

Answer Sheet

A B C D E

You are provided with an ORDINARY HB pencil with which you are to record your answers on the separate answer sheet. Make sure your answer marks are heavy and black and that they do not extend beyond the guide lines. If you change your mind about an answer, be sure to erase your first mark as completely as possible. There should only be one choice marked for each question. Be sure there are no stray pencil marks on your answer sheet.

NOTE: GEOMETRIC FIGURES IN THIS SECTION ARE NOT DRAWN TO SCALE.

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1. The number in the following list which is not prime is

1. A. 29 B. 41 C. 39
D. 37 E. 17

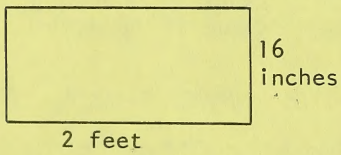
2. The value of $\sqrt{64}$ is

2. A. 32 B. 4096 C. 4
D. 128 E. 8

3. A cubical box has an edge of 20 cm. It holds

3. A. 60 c.cm. B. 80 c.cm. C. 6 litres
D. 8 litres E. 20 litres

4. The area of the rectangle shown is



4. A. $2\frac{2}{3}$ sq. ft.
B. 32 sq. ft.
C. 32 sq. in.
D. 2½ sq. ft.
E. $3\frac{5}{9}$ sq. ft.

FOR CALCULATION

(No marks given for work in this space)

5.	$(+9) + (-5) =$	**5.**	A. -14	B. -4	C. $+14$
			D. $+4$	E. -45	
6.	$(-2a)(+3b) =$	**6.**	A. $-6ab$	B. $-5ab$	C. $-6a+b$
			D. $-2a + 3b$	E. ab	
7.	$(-3t) - (-5t) =$	**7.**	A. $8t$	B. $-8t$	C. $-8t^2$
			D. $-2t$	E. $2t$	
8.	Of the following, the geometric figure which is a quadrilateral is a	**8.**	A. pentagon	B. trapezoid	C. triangle
			D. sphere	E. cylinder	
9.	The simple interest on \$200 for 2 years at 5% per annum is	**9.**	A. \$50	B. \$10	C. \$5000
			D. \$2000	E. \$20	
10.	A chord that passes through the center of a circle is called a	**10.**	A. secant	B. sector	C. radius
			D. diameter	E. circumference	
11.	$(-7) - (+4) =$	**11.**	A. $+11$	B. -11	C. -3
			D. $+3$	E. -28	
12.	$\dfrac{\frac{2}{3} + \frac{3}{5}}{\frac{5}{6} - \frac{2}{3}} =$	**12.**	A. $7\frac{3}{5}$	B. $\frac{18}{25}$	C. $\frac{5}{8}$
			D. $1\frac{23}{25}$	E. $1\frac{21}{30}$	
13.	$(.2)^5 =$	**13.**	A. 1.0	B. .32	C. .10
			D. .0032	E. .00032	

FOR CALCULATION

(No marks given for work in this space)

14. If the sum of 12 and 4 is subtracted from the product of 12 and 4, the result is	**14.**	A. 32	B. –13	C. 64
		D. 0	E. –32	
15. ¼% of $120.00 is	**15.**	A. $30.00	B. $3.00	C. $4.80
		D. $ .30	E. $ .48	
16. The sum of $7z$, z and $3z$ is	**16.**	A. $10z$	B. $11z^3$	C. $21z^3$
		D. $11z$	E. $10z^3$	
17. The product of $3a$, $2ab$ and $5bc$ is	**17.**	A. $6a^2b + 15abc$		
		B. $3a + 2ab + 5bc$		
		C. $30a^2b^2c$		
		D. $10abc$		
		E. $10a^2b^2c$		
18. The cost of 2 lb. 6 oz. of grapes at 32¢ per lb. is	**18.**	A. $.80	B. $15.36	C. $.83
		D. $.76	E. $ .64	
19. A square has a perimeter of 64 inches. The circumference of the circle which would just fit inside it is	**19.**	A. 8π in.	B. 16π in.	C. 64π in.
		D. $64\pi^2$ in.	E. 200 in.	

FOR CALCULATION

(No marks given for work in this space)

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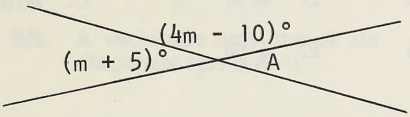
20. $(3a + 4b)(2a + 3b) =$

20. A. $7ab + 5ab$
B. $5a^2 + 12ab + 7b^2$
C. $35a^2b^2$
D. $6a^2 + 12b^2$
E. $6a^2 + 17ab + 12b^2$

21. The measure of $\angle A$ is



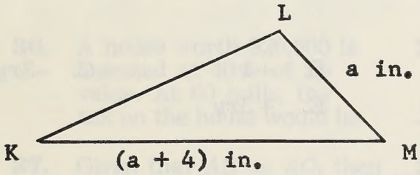
21. A. 25° B. 138° C. 37°
D. 185° E. 42°

22. The greatest common factor of 18, 30 and 36 is

22. A. 6 B. 3 C. 18
D. 180 E. 9

23. The ratio of LM to KM is 1:3. KM is

23. A. 6 in. B. 2 in. C. –2 in.
D. 10 in. E. 7 in.



24. The digits that make up the period of the recurring decimal that is equal to $\frac{5}{33}$ are

24. A. 15 B. 5 C. 151
D. 515 E. 15151

25. The difference between the supplement of an angle of 40° and the complement of an angle of 60° is

25. A. 80° B. 110° C. 20°
D. 90° E. 100°

26. The least common multiple of 4, 7 and 14 is

26. A. 56 B. 28 C. 1
D. 392 E. 98

FOR CALCULATION

(No marks given for work in this space)

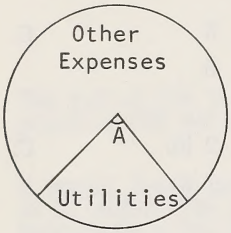
27. The statement which is true for BOTH a rhombus and a rectangle is:

27. A. The diagonals bisect the angles through which they pass.
B. The diagonals are equal.
C. There are two axes of symmetry.
D. The diagonals meet each other at right angles.
E. The adjacent sides meet at right angles.

28. $(a - b) - (a + b) =$

28. A. 0 B. $-2a - 2b$ C. $-2b$
D. $a^2 - b^2$ E. $-2a + 2b$

29. The circle graph shows the portion of a company's budget spent on utilities. $\angle A = 72°$. The percent of the total budget represented by the utilities is

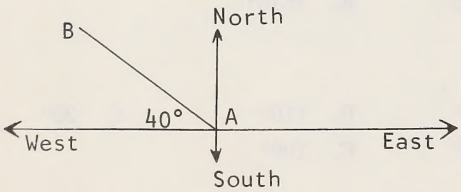


29. A. 20% B. 40% C. 80%
D. 72% E. $\frac{1}{5}\%$

30. $\dfrac{(6xy)\ (-2xy)}{4xy} =$

30. A. -3 B. $+1$ C. $-3xy$
D. $-\dfrac{3}{4}$ E. $+3xy$

31. In the diagram, the bearing of B from A is

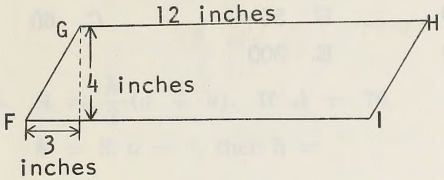


31. A. $N\ 40°\ W$
B. $N\ 40°\ E$
C. $N\ 50°\ W$
D. $S\ 40°\ E$
E. $S\ 50°\ E$

FOR CALCULATION

(No marks given for work in this space)

32. The perimeter of parallelogram *FGHI* is



32. A. 48 in. B. 32 in. C. 17 in. D. 16 in. E. 34 in.

33. A rectangle and one of its diagonals forms two

33. A. congruent triangles
B. parallelograms
C. obtuse triangles
D. acute triangles
E. quadrilaterals

34. The number of mills equivalent to 6% is

34. A. .06 B. $\frac{3}{5}$ C. 6 D. 60 E. 600

35. $\frac{-3^4}{(-3)^2} =$

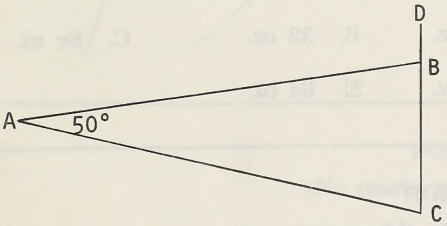
35. A. –2 B. +9 C. +2 D. –3 E. –9

36. A house worth $20,000 is assessed at 40% of its value. At 60 mills, the tax on the house would be

36. A. $8,000 B. $1,200 C. $480 D. $120 E. $48

37. Given that $AB = AC$, then $\angle ABD$ is

37. A. 50° B. 130° C. 65° D. 115° E. 155°



FOR CALCULATION

(No marks given for work in this space)

38. $3 + 5 \times 3 - 12 \div 2 + 4 =$

38. A. 16 B. 22 C. 10 D. 8 E. 20

39. Frequency Distribution Table of Scores on an Examination:

Score	Frequency
80	1
70	0
60	1
50	2
40	1

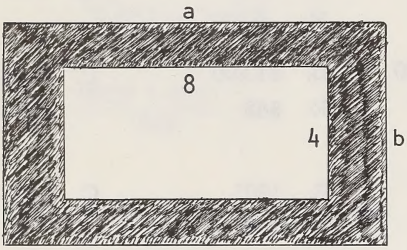
The arithmetic mean is

39. A. 50 B. 56 C. 60 D. 70 E. 300

40. A Canadian football field is 110 yd. long. If it were 110 meters long, (1 meter = 1.09 yd.) the field would be

40.
A. the same length
B. 9.9 yd. longer
C. 19.9 yd. longer
D. 19.9 meters longer
E. 119.9 yd. longer

41. The formula for the area of the shaded portion of the figure is



41.
A. $A = 2(a + b) + 24$
B. $A = a^2 + b^2 + 32$
C. $A = ab - 32$
D. $A = (a - 8)(b - 4)$
E. $A = 2a + 2b - 32$

42. If an aluminum ball 2″ in diameter weighs 8 oz., then a similar ball 4″ in diameter would weigh

42. A. 16 oz. B. 32 oz. C. 8π oz. D. $\frac{40}{3}$ oz. E. 64 oz.

FOR CALCULATION

(No marks given for work in this space)

43. $4x + 4 - (3x - 2) =$

43. A. $7x + 2$
B. $x + 6$
C. $-7x - 6$
D. $x + 2$
E. $-12x^2 - 20x - 8$

44. $A = \frac{h}{2}(a + b)$. If $A = 76$, $h = 8$, $a = 7$, then $b =$

44. A. 7.5 B. 7.6 C. 12
D. 23 E. 106

45. The two missing values in the table are

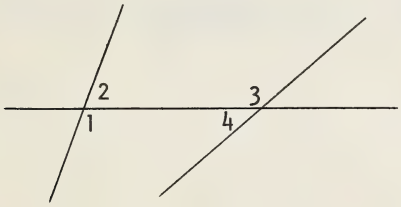
n	−5	−4	−2	0	+2	+4	+6
t	−125		−8	0	+8	+64	

45. A. −64, +216
B. +64, +216
C. −64, −216
D. −16, +36
E. +16, +36

46. If .025 and .450 are approximate numbers then .025 ÷ .450, correct to the required number of significant digits, is

46. A. $.0\dot{5}$ B. .055 C. .0555
D. .0556 E. .056

47. The statement which is TRUE for the diagram below is:



47. A. ∠ 1 and ∠ 4 are supplementary
B. ∠ 2 and ∠ 4 are vertically opposite
C. ∠ 1 and ∠ 3 are interior and complementary
D. ∠ 2 + ∠ 3 = ∠ 1 + ∠ 4
E. ∠ 1 and ∠ 3 are interior and alternate

FOR CALCULATION

(No marks given for work in this space)

48. In 30 minutes the hour hand of a clock turns through

48. A. 180° B. 15° C. 30°
D. 2½° E. ½°

49. A cylindrical tin can has height a inches and radius b inches. The formula for the area of its curved surface is

49. A. $A = 2\pi ab$
B. $A = \pi ab$
C. $A = \pi b(a + 2b)$
D. $A = 2\pi b^2 + 2\pi ab$
E. $A = \frac{1}{4}\pi b^2 + \pi ab$

50. If $r = 3$ and $s = -2$, the value of $r^3 - s^3$ is

50. A. 125 B. 35 C. 19
D. 15 E. 3

51. In the following list, the expression which is NOT an algebraic term is

51. A. 6×4 B. $2ab$ C. $\frac{3}{2a}$
D. $6 + a^2$ E. πd

52. A single discount equivalent to successive discounts of 10% and 5% is

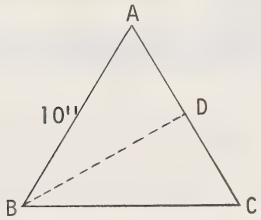
52. A. 15% B. 18.5% C. 14.5%
D. 4.5% E. 45%

53. The least common multiple of $6mn$, $8m^2$ *and* $10mn^3$ is

53. A. m^2n^3 B. 120 C. $480m^2n^3$
D. $2m$ E. $120m^2n^3$

54. ABC is an equilateral triangle. BD is an altitude. The measure of BD is

54. A. 10 in. B. 5 in. C. 15 in.
D. $\sqrt{75}$ in. E. $\sqrt{125}$ in.



FOR CALCULATION

(No marks given for work in this space)

55. If you multiply the reciprocal of $\frac{2y}{x}$ by the coefficient of x in $6xy$, the result is

55. A. $3x$ B. $\frac{12y^2}{x}$ C. $12y^2$ D. $\frac{3x}{y}$ E. $\frac{x}{2}$

56. Of the following the statement which is FALSE is:

56.
A. If a triangle is isosceles, then the angles opposite the equal sides are equal.
B. If the areas of two squares are equal then their perimeters are equal.
C. If two triangles are equal in area, then the triangles are congruent.
D. If a figure is a square, then all its angles are right angles.
E. If the areas of two circles are equal, then their diameters are equal.

57. If $3m + 2n$ is multiplied by $2a + b$, the number of terms in the product is

57. A. 1 B. 2 C. 3 D. 4 E. 5

58. The scale drawing of a rectangular room is 8 cm. by 12 cm. If 1 cm. represents 2½ ft., the perimeter of this room is

58. A. 20 ft. B. 40 ft. C. 50 ft. D. 96 ft. E. 100 ft.

59. $\frac{(x + 2)^2 (x + 4)}{4(x + 2)} =$

59.
A. x
B. $x(x + 2)$
C. $\frac{(x + 2)(x + 4)}{4}$
D. $\frac{x + 4}{4}$
E. $\frac{(x + 2)(x + 4)}{2(x + 2)}$

FOR CALCULATION

(No marks given for work in this space)

60. $M = 2p + r$. A formula equivalent to the given one is

60. A. $p = 2M - r$

B. $p = \dfrac{M - r}{2}$

C. $p = \dfrac{2}{M - r}$

D. $p = \dfrac{M}{2 + r}$

E. $p = \dfrac{M}{2} + r$

61. If $a = 2$ and $b = 3$, the value of $4a^2 + 4ab - b^2$ is

61. A. 79 B. 34 C. 31 D. 49 E. 48

62. If you divide $bm + cm + m$ by m, the quotient is

62. A. $b + cm + m$
B. $bm + c + m$
C. $bm + cm$
D. $b + c + 1$
E. $b + c$

63. The formula which shows how f depends on d is

d	0	1	2	3	4
f	–10	–5	0	5	10

63. A. $f = 5d + 10$

B. $f = 5d - 10$

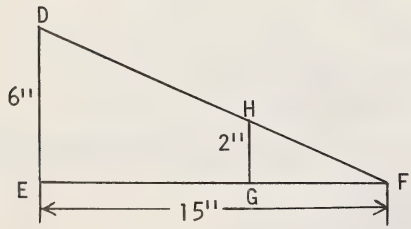
C. $f = d + 5$

D. $f = -10d$

E. $f = d - 10$

64. Triangle DEF and HGF are similar. The length of EG is

64. A. 9 in. B. 10 in. C. 3 in. D. 7½ in. E. 5 in.



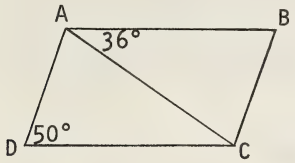
FOR CALCULATION

(No marks given for work in this space)

65. A merchant bought goods for \$1,000 and marked them up 30%. He sold them for \$1,180. The discount that he gave was

65. A, \$120 B. \$180 C. \$300 D. \$30 E. \$35.40

66. $ABCD$ is a parallelogram. The measure of $\angle BCA$ is



66. A. 86° B. 50° C. 94° D. 36° E. 130°

67. $\frac{6}{x} + \frac{9}{2x} =$

67. A. $\frac{15}{3x}$ B. $\frac{21}{2x}$ C. $\frac{15}{2x}$ D. $\frac{54}{2x^2}$ E. $\frac{21}{4x^2}$

68. At the rate of 4% simple interest, the sum of money that would amount to \$1,200 in 5 years is

68. A. \$1,440 B. \$1,500 C. \$1,000 D. \$240 E. \$960

69. If you subtract $3m + 4$ from $7m^2 - 2m$, the difference is

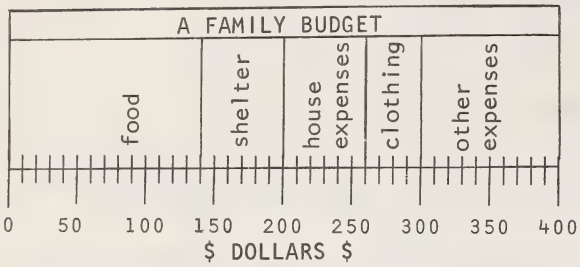
69. A. $4m^2 - 2m - 4$
B. $7m^2 - 5m + 4$
C. $7m^2 + m + 4$
D. $-7m^2 + 5m + 4$
E. $7m^2 - 5m - 4$

FOR CALCULATION

(No marks given for work in this space)

70. The graph of one family's monthly expenditures of $400.00 shows that:

70. A. 10% of the expenditure is used for clothing.
B. $300 is spent on clothing.
C. The cost of food has increased rapidly.
D. Only 75% of the income is spent.
E. 50% of the income is used for shelter.

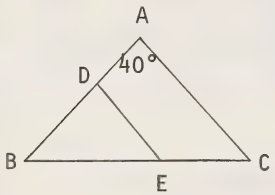


71. $ab = 0$. Therefore it is certain that:

71. A. $a - b = 0$
B. $a + b = 0$
C. $a = b$
D. either $\frac{1}{a} = b$ or $\frac{1}{b} = a$
E. either $a = 0$ or $b = 0$

72. $AB = AC$ and DE is parallel to AC. $\angle DEB$ is

72. A. 25° B. 40° C. 50°
D. 70° E. 140°



73. $(5x + 3y)^2 =$

73. A. $10x + 6y$
B. $25x^2 + 30x^2y^2 + 9y^2$
C. $25x^2 + 9y^2$
D. $25x^2 + 30xy + 9y^2$
E. $64x^2y^2$

FOR CALCULATION

(No marks given for work in this space)

74. An automobile travelled 240 miles in 6 hours. At this rate the time it would take to travel 320 kilometers is (5 mi. = 8 km.)

74. A. $4\frac{1}{2}$ hr. B. 5 hr. C. 8 hr. D. $1\frac{1}{2}$ hr. E. 2 hr.

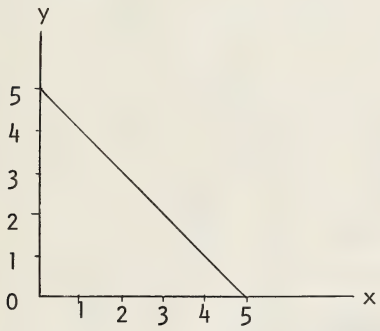
75. A repair shop makes a basic charge of \$5.00 and an additional charge of \$2.00 per hour for the number of hours it takes to do the job. The formula which expresses the total charge, \$C, for n hours of work is

75. A. $C = 2n + 5$
B. $C = 2(n + 5)$
C. $C = 10n$
D. $C = 2n - 5$
E. $C = 2(n - 5)$

76. $\frac{1}{x} = \frac{3}{a} - \frac{1}{b}$. If $a = 4$ and $b = 10$ in the above equation, then x equals

76. A. $\frac{1}{3}$ B. $-\frac{1}{3}$ C. .65 D. $\frac{20}{13}$ E. $\frac{13}{20}$

77. This is the graph of the formula



77. A. $y = x + 5$
B. $5y + 5x = 0$
C. $x - y = 5$
D. $xy = 5$
E. $x + y = 5$

FOR CALCULATION

(No marks given for work in this space)

78. A house is insured for \$9,000. If the rate is 42¢ on \$100 for 3 years, the 3-year premium is

78. A. \$378.00 B. \$90.00 C. \$126.00
D. \$37.80 E. \$12.60

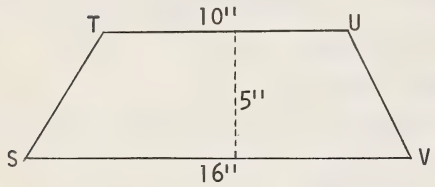
79. $\frac{2}{3} r^2 - 0.5\, r^2 + \frac{1}{8} r^2 =$

79. A. $\frac{4}{120} r^2$ B. $\frac{7}{24} r^2$ C. $\frac{71}{120} r^2$
D. $\frac{2}{9} r^2$ E. $\frac{1}{24} r^2$

80. If $a = 2$ and $b = 3$, the value of $(a + b)(a - b)^2$ is

80. A. 25 B. 5 C. –5
D. –25 E. 4

81. *TU* is parallel to *SV*. The area of the geometric figure is



81. A. 50 sq. in.
B. 80 sq. in.
C. 130 sq. in.
D. 65 sq. in.
E. 31 sq. in.

82. The expression $\frac{w^2 - wx}{wx - x^2}$ equals

82. A. $\frac{w^2}{x^2}$ B. 1 C. $\frac{w}{x}$
D. $\frac{w^2 - 1}{1 - x^2}$ E. $\frac{w^2}{-x^2}$

FOR CALCULATION

(No marks given for work in this space)

Values

SECTION B

83. Solve each of the following equations and check your answers. All work must be shown in the spaces provided.

3 (a) $6x + 7 = 15 + 4x$ Check Here.

5 (b) $5 - 4(t - 3) = 3(t + 2) - 3$ Check Here.

5 (c) $\frac{2x}{3} + 5 = \frac{6x - 5}{4}$ Check Here.

FOR CALCULATION

(No marks given for work in this space)

Values

4 **84.** The length of a rectangular piece of property is twice its width. If the total perimeter is 360 yards, what is the width of the property?
(An ALGEBRAIC solution is required.)

6 **85.** A taxi charges 60¢ for the first mile of a trip and 10¢ for each quarter mile thereafter. How many miles could you ride for $3.50?
(An ALGEBRAIC solution is required.)

FOR CALCULATION

(No marks given for work in this space)

Values

5 **86.** The sum of the ages of a father and his son at the present is 54. In 7 years, the father will be 3 times as old as his son. How old is the son today? (An ALGEBRAIC solution is required.)

4 **87.** IN SOLVING THE FOLLOWING PROBLEM INDICATE, IN THE SPACE PROVIDED, THE STEPS USED IN ARRIVING AT YOUR SOLUTION.

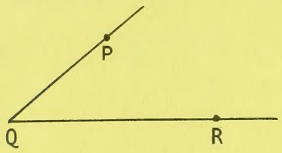
At noon on August 1, the space vehicle "Zenna" began orbiting the earth at an average rate of 18 orbits per day (24 hours). At noon on August 4 of the same year, "Bronza" began to orbit the earth at a rate of 20 orbits per day. When Zenna and Bronza have completed the same number of orbits, how many days has Bronza been in orbit?

FOR CALCULATION

(No marks given for work in this space)

Values

3 **88.** Using compasses and straight edge only, construct $\angle STV$ equal to $\angle PQR$, using TS as one arm.



T ———————————— S

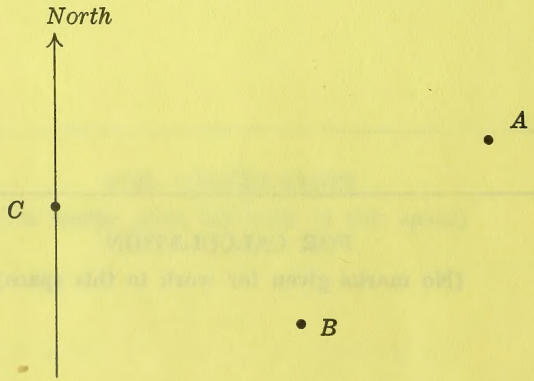
3 **89.** Using compasses and straight edge only, locate point X on AB so that

$$AX = \frac{1}{3} BX.$$

A ———————————— B

90. Two rocks at points A and B and a lighthouse at point C are located as shown in the figure.

3 (a) Using compasses and straight edge locate a buoy so that it is equidistant from the rocks and the lighthouse. Label the buoy X.



2 (b) In the above figure, the distance in miles from B to C is ———————— •
(Scale: 1 cm. represents 5 mi.)

2 (c) In the above figure, the bearing of B from C is ———————— •

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